Wind tunnel AER stats

Sasha D. Hafner

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Get wind tunnel data only.

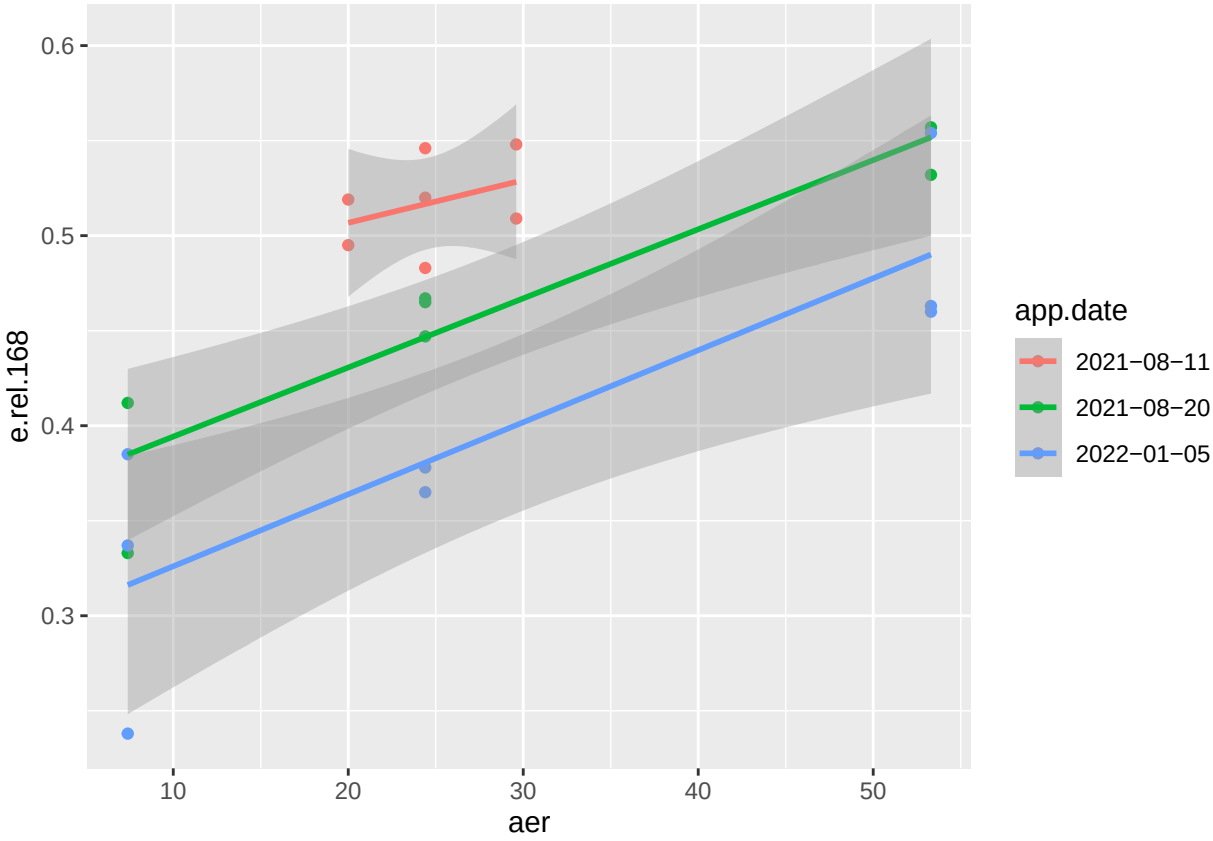
```
wsumm <- subset(isumm, meas.tech == 'Wind tunnel')
dfsumm(as.data.frame(wsumm))
```

```
##
##  22 rows and 23 columns
##  22 unique rows
##                      trial.nm   app.date    pmid   meas.tech meas.tech2     aer
## Class                character  character integer   character  character numeric
## Minimum               A 11 Aug 2021-08-11    1904 Wind tunnel         wt     7.4
## Maximum               C 05 Jan 2022-01-05    1925 Wind tunnel         wt    53.3
## Mean                      <NA>       <NA>    <NA>        <NA>       <NA>    27.2
## Unique (excld. NA)           3          3      22           1          1       5
## Missing values               0          0       0           0          0       0
## Sorted                    TRUE       TRUE    TRUE        TRUE       TRUE   FALSE
##
##                          aer.grp     cta air.temp.mean air.temp.min
## Class                     factor numeric       numeric      numeric
## Minimum              Low 7 or 20     181          2.46         -3.4
## Maximum             High 30 or 54     211          15.4         11.4
## Mean                   Medium 25     193          10.5         4.93
## Unique (excld. NA)             3       3             6            6
## Missing values                 0       0             0            0
## Sorted                     FALSE   FALSE         FALSE        FALSE
##
##                     air.temp.max wind.2m.mean wind.2m.min wind.2m.max rain.cum
## Class                    numeric      numeric     numeric     numeric  numeric
## Minimum                      8.5          0.1         0.1         0.1        0
## Maximum                     22.3         0.72        0.72        0.72        0
## Mean                        17.1        0.367       0.367       0.367        0
## Unique (excld. NA)             6            5           5           5        1
## Missing values                 0            0           0           0        0
## Sorted                     FALSE        FALSE       FALSE       FALSE     TRUE
##
##                     rain.cum.48 j.NH3.mean j.NH3.min j.NH3.max e.cum.final
## Class                   numeric    numeric   numeric   numeric     numeric
## Minimum                       0     0.0763         0     0.431        16.1
## Maximum                       0      0.217    0.0309      3.54        39.2
## Mean                          0      0.163    0.0061       2.2        31.1
## Unique (excld. NA)            1         22        12        22          22
## Missing values                0          0         0         0           0
## Sorted                     TRUE      FALSE     FALSE     FALSE       FALSE
```

```
##
##                     e.rel.final e.cum.168 e.rel.168
## Class                   numeric   numeric   numeric
## Minimum                   0.261      14.7     0.238
## Maximum                   0.585        39     0.557
## Mean                      0.467      30.4     0.455
## Unique (excld. NA)           21        20        22
## Missing values                0         0         0
## Sorted                    FALSE     FALSE     FALSE
##
```

```
ggplot(wsumm, aes(aer, e.rel.168, colour = app.date)) +
  geom_point() + geom_smooth(method = lm)
```

```
## `geom_smooth()` using formula 'y ~ x'
```




```
m1 <- lm(e.rel.168 ~ aer + factor(app.date), data = wsumm)
summary(m1)
```

```
##
## Call:
## lm(formula = e.rel.168 ~ aer + factor(app.date), data = wsumm)
##
## Residuals:
##       Min        1Q    Median        3Q       Max
## -0.080035 -0.024089  0.002087  0.018987  0.066965
##
## Coefficients:
```

```
##                               Estimate Std. Error t value Pr(>|t|)
## (Intercept)                  0.4259551  0.0188201  22.633 1.13e-14 ***
## aer                          0.0037025  0.0005051   7.331 8.31e-07 ***
## factor(app.date)2021-08-20 -0.0698851  0.0200371  -3.488  0.00263 **
## factor(app.date)2022-01-05 -0.1353191  0.0194566  -6.955 1.69e-06 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.03737 on 18 degrees of freedom
## Multiple R-squared:  0.8365, Adjusted R-squared:  0.8093
## F-statistic: 30.71 on 3 and 18 DF,  p-value: 2.71e-07
```

```
anova(m1)
```

```
## Analysis of Variance Table
##
## Response: e.rel.168
##                  Df   Sum Sq  Mean Sq F value    Pr(>F)
## aer               1 0.061055 0.061055  43.729 3.293e-06 ***
## factor(app.date)  2 0.067569 0.033785  24.197 7.912e-06 ***
## Residuals        18 0.025132 0.001396
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
confint(m1)
```

```
##                                  2.5 %       97.5 %
## (Intercept)                  0.386415636  0.465494589
## aer                          0.002641399  0.004763638
## factor(app.date)2021-08-20 -0.111981551 -0.027788710
## factor(app.date)2022-01-05 -0.176195933 -0.094442180
```

```
drop1(m1, test = 'F')
```

```
## Single term deletions
##
## Model:
## e.rel.168 ~ aer + factor(app.date)
##                  Df Sum of Sq      RSS     AIC F value    Pr(>F)
## <none>                        0.025132 -141.04
## aer               1  0.075031 0.100163 -112.62  53.739 8.311e-07 ***
## factor(app.date)  2  0.067569 0.092701 -116.33  24.197 7.912e-06 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
m2 <- lm(e.rel.168 ~ aer * factor(app.date), data = wsumm)
summary(m2)
```

```
##
## Call:
## lm(formula = e.rel.168 ~ aer * factor(app.date), data = wsumm)
##
## Residuals:
##       Min        1Q    Median        3Q       Max
## -0.078183 -0.019629  0.001868  0.020200  0.068817
##
## Coefficients:
```

```
##                                  Estimate Std. Error t value Pr(>|t|)
## (Intercept)                      0.461890   0.102154   4.522 0.000348 ***
## aer                              0.002243   0.004103   0.547 0.592106
## factor(app.date)2021-08-20      -0.103995   0.105890  -0.982 0.340669
## factor(app.date)2022-01-05      -0.173744   0.105040  -1.654 0.117596
## aer:factor(app.date)2021-08-20  0.001393   0.004190   0.333 0.743782
## aer:factor(app.date)2022-01-05  0.001545   0.004162   0.371 0.715286
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.03945 on 16 degrees of freedom
## Multiple R-squared:  0.838,  Adjusted R-squared:  0.7874
## F-statistic: 16.56 on 5 and 16 DF,  p-value: 7.928e-06
```

```
anova(m2)
```

```
## Analysis of Variance Table
##
## Response: e.rel.168
##                       Df   Sum Sq  Mean Sq F value    Pr(>F)
## aer                    1 0.061055 0.061055 39.2292 1.131e-05 ***
## factor(app.date)       2 0.067569 0.033785 21.7073 2.766e-05 ***
## aer:factor(app.date)   2 0.000230 0.000115  0.0739    0.9291
## Residuals             16 0.024902 0.001556
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
confint(m2)
```

```
##                                       2.5 %     97.5 %
## (Intercept)                      0.245332915 0.67844701
## aer                             -0.006455297 0.01094219
## factor(app.date)2021-08-20      -0.328471983 0.12048249
## factor(app.date)2022-01-05      -0.396419340 0.04893223
## aer:factor(app.date)2021-08-20 -0.007488873 0.01027570
## aer:factor(app.date)2022-01-05 -0.007277640 0.01036830
```

```
drop1(m2, test = 'F')
```

```
## Single term deletions
##
## Model:
## e.rel.168 ~ aer * factor(app.date)
##                       Df  Sum of Sq      RSS     AIC F value Pr(>F)
## <none>                               0.024902 -137.25
## aer:factor(app.date)   2 0.00023003 0.025132 -141.04  0.0739 0.9291
```